OCEAN GALES AND STORMS, SEPTEMBER 1933—Continued

Vessel	Voyage		Position at time of lowest barometer		Gale began	Time of lowest barometer	Gale ended	Lowest barometer	Direction of wind when gale began	Direction and force of wind at time of lowest barometer	Direction of wind when gale ended	Direction and highest force of wind	Shifts of wind near time of lowest barometer
	From—	To—	Latitude	Longitude									
			° ′	° ′				*Inches*					
Monarch of Bermuda, Br.M.S.	New York	Bermuda	39 15 N	72 42 W	Sept. 16	7a., 17	Sept. 17	28.85	NE	NW, 10	WSW	ENE, 12	ENE - NW - WNW.
James McGee, Am.S.S.	Boston	Galveston	37 18 N	69 15 W	do	7a., 17	do	29.34	SE	SSW, 10	do	S, 10	SSE-S-SSW.
Jean Jadot, Belg.S.S.	Antwerp	New York	40 03 N	71 50 W	Sept. 17	10a., 17	do	29.13	E	N, 10	WNW	N, 11	NNE-N-NNW.
Bremen, Ger.S.S.	New York	Bremerhaven	39 54 N	69 16 W	do	2p., 17	do	28.50	ENE	WSW, 12	W	WSW, 12	SE-SSW-W.
Executive, Am.S.S.	Lisbon	New York	40 15 N	69 15 W	do	3p., 17	do	28.56	SE	SE, 4	NW	NW, 11	SE-lull-NW.
City of Norfolk, Am.S.S.	Havre	Norfolk	40 21 N	67 17 W	do	6p., 17	Sept. 18	28.77	ESE	S, 10	WNW	WSW, 11	S-WSW.
United States, Dan.S.S.	New York	Christiansand	42 20 N	63 50 W	Sept. 16	2a., 18	do	28.91	ENE	SW, 10	SW	SW, 10	SE-S-SW.
Ile de France, Fr.S.S.	Havre	New York	41 23 N	60 49 W	Sept. 18	7a., 18	do	29.33	SSE	SW, 8	WSW	SW, 8	S-SW-WSW.
Kenbane Head, Br.S.S.	Glasgow	Montreal	50 55 N	58 00 W	do	1a., 19	Sept. 19	28.50	S	SSE, —	NW	S, 9	S-SSE.
Mopan, Br.S.S.	Swansea	Puerto Castilla.	17 43 N	81 25 W	Sept. 20	4p., 20	Sept. 21	29.89	E	S, 8	SSW	do	S.
Tivives, Am.S.S.	Cristobal	Habana	19 29 N	85 47 W	Sept. 21	Noon, 21	Sept. 22	29.30	NW	W, 10	SSE	SE, 12	W-SW.
Maine, Dan.S.S.	New Castle	Montreal	58 19 N	32 35 W	Sept. 22	10a, 22	Sept. 23	29.28	WNW	W, 8	SW	W, 10	
Munplace, Am.S.S.	Progreso	New Orleans	21 18 N	89 39 W	do	4p., 22	Sept. 22	29.34	N	NE, 9	SE	NE, 9	NE-E.
Morazan, Hond.S.S.	Vera Cruz	do	20 35 N	95 00 W	Sept. 24	5a., 24	Sept. 24	29.47	SW	SSW, 10	SSE	SSW, 10	SSW-S.
San Lamberto, Br. S.S.	Tampico	Tuxpam	21 01 N	97 16 W	do	2p., 24	do	[2] 29.19	W	WSW, 10	E	WSW, 10	W-WSW-S.
Adria, Ger.S.S.	In port of Tampico.		22 24 N	97 00 W	do	8p., 24	Sept. 25	28.86	NW	NE, 12		SE, 12	N-NE-SE.
Cavina, Br.S.S.	Avonmouth	Barbados	31 52 N	36 01 W	do	7p., 24	Sept. 24	29.54	ESE	WNW, 8	NW	WNW, 10	ESE-W-NW.
Exiria, Am.S.S.	Faro	New York	36 34 N	38 05 W	Sept. 25	10p., 25	Sept. 26	29.40	SE	NW, 10	WNW	NW, 10	E-N-NW.
Holystone, Br.S.S.	St. Thomas, Virgin Islands.	London	36 52 N	37 10 W	do	11p., 25	do	29.67	N	NW, 11	W	NW, 11	NNW - NW-WNW.
Black Tern, Am.S.S.	New York	Antwerp	48 48 N	29 12 W	Sept. 27	Noon, 27	Sept. 27	29.55	SE	SSE, 9	SW	SSE, 9	SE-SSE-S.
Milwaukee Ger.M.S.	Galway	New York	52 18 N	26 00 W	do	Mdt., 27	Sept. 28	29.46	SSE	S, 10	WNW	S, 10	SE-S-SSW.
Virginia, Am.S.S.	Habana	Cristobal	18 38 N	83 07 W	Sept. 20	8p., 20	Sept. 20	27.40	ENE	Calm	S	NE, 12	NE-SSW.
NORTH PACIFIC OCEAN													
Golden Horn, Am.S.S.	Moji, Japan	Shanghai	31 10 N	123 50 E	Sept. 2	3a., 3	Sept. 3	28.12	NE	Calm	WNW	NE, 12	ENE - Calm - WSW.
Clydefield, Br.S.S.	Woosung	Los Angeles	31 20 N	121 30 E		4a., 3	Sept. 4	29.59		NNW, 8	NW	NNW, 8	
Empress of Russia, Br.S.S.	Vancouver	Yokohama	38 38 N	144 40 E	Sept. 4	10a., 5	Sept. 6	29.25	E	S, 8	WSW	S, 8	None.
President Cleveland, Am.S.S.	Seattle	Japan	51 28 N	163 20 W	Sept. 5	10a., 6	do	29.16	SSE	N, 9	W	N, 9	ESE-N-NW.
Seattle, Am.S.S.	do	Yokohama	45 20 N	159 36 E	Sept. 8	6a., 8	Sept. 8	29.65	WSW	WSW, 8	WNW	W, 9	None.
President Cleveland, Am.S.S.	do	Japan	49 17 N	176 33 E	Sept. 9	Noon, 9	Sept. 12	29.43	S	SW, 5	NNE	W, 8	S-SW-W.
City of Elwood, Am.S.S.	Shanghai	Los Angeles	36 20 N	145 57 E	Sept. 15	10p., 15	Sept. 16	29.94	do	S, 7	SSE	S, 8	None.
Golden Peak, Am.S.S.	Portland, Oreg.	Yokohama	40 24 N	149 05 E	Sept. 16	2a., 17	do	29.67	do	SSE, 3	do	S, 9	SSE-SW-NW.
City of Elwood, Am.S.S.	Shanghai	Los Angeles	[1] 41 35 N	161 25 E	Sept. 18	6a., 19	Sept. 19	28.71	SE	SSE, 10	SSW	SSE, 10	SE-S.
President Jackson, Am.S.S.	Victoria, British Columbia.	Yokohama	52 20 N	147 46 W	Sept. 19	4a., 19	do	29.53	NW	NW, 6	NNW	NNW, 8	WNW - NW - NNW.
Fernbrook, Nor.M.S.	Shanghai	Victoria	50 20 N	132 45 W	Sept. 21	3p., 21	Sept. 22	29.21	W	WNW, 8	W	WNW, 8	W-WNW-W.
Juyo Maru, Jap.S.S.	Muroran	Seattle	46 24 N	157 20 E	Sept. 26	4a., 26	Sept. 27	29.63	ENE	NE, 7	E	E, 9	NE-ENE.
Glasgow Maru, Jap.S.S.	Yokohama	Los Angeles	42 51 N	142 05 W	Sept. 27	10a, 27	Sept. 28	29.56	SW	WSW, —	W	WSW, 10	SW-WSW.
Manini, Am.S.S.	Seattle	Honolulu	47 00 N	128 06 W	do	10p., 27	do	29.36	S	S, 9	WSW	S, 9	S-SW.
Ogura Maru, Jap.M.S.	Yokohama	Los Angeles	38 33 N	155 46 E	Sept. 28	Noon, 29	Sept. 29	29.58	do	SW, 7	NW	W, 8	SSW - SW - WSW.
Texas, Am.S.S.	Port Real, Luzon.	San Francisco.	41 45 N	179 05 W	Sept. 30	8a., 30	Oct. 1	29.49	WSW	W, 7	do	NW, 8	W-NW.

[1] Position approximate.

[2] Barometer uncorrected.

NORTH PACIFIC OCEAN, SEPTEMBER 1933

By WILLIS E. HURD

Atmospheric pressure.—The Aleutian LOW was persistent through September 1933, with average center over the Gulf of Alaska (mean pressure at Kodiak, 29.69 inches). Pressure was below normal along the entire American coast from Kodiak eastward and southward, with the point of greatest departure, −0.18 inch, at Juneau. Over most of the remainder of the North Pacific, pressures were somewhat above normal, except in the extreme southwestern part, where Manila was 0.06 inch below.

High pressure during the greater part of the month covered most of the central part of the ocean.

Cyclones and gales.—While depressions were prevalent over northern waters, gales were infrequent and wind forces as a rule did not exceed 8 or 9. The deepest and most active storm center of the month, with pressures below 29 inches, lay off the Canadian and lower Alaskan coasts on the 27th and 28th. Rather widespread gales attended its slow movement eastward. On the 27th, for instance, a whole gale (force 10) from west-southwest was reported in 43°N., 142°W., and on the 28th Tatoosh Island experienced a 62-mile south wind (force 10).

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure at sea level, North Pacific Ocean, September 1933, at selected stations*

Stations	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Inches	*Inch*	*Inches*		*Inches*	
Point Barrow	29.93	+0.03	30.46	1	29.60	20
Dutch Harbor	29.78	+.02	30.52	15	29.10	12
St. Paul	29.78	+.07	30.36	15	29.28	12
Kodiak	29.69	−.02	30.18	1	29.16	26
Juneau	29.74	−.18	30.23	5	28.96	28
Tatoosh Island	29.90	−.11	30.30	30	29.42	21
San Francisco	29.90	−.04	30.13	18	29.68	7
Mazatlan	29.76	−.06	29.84	1, 9, 18–20	29.58	16
Honolulu	30.06	+.06	30.15	14	29.94	30
Midway Island	30.10	+.09	30.18	19	29.96	14
Guam	29.83	.00	29.90	18, 27, 29	29.74	8
Manila	29.77	−.06	29.90	20	29.62	16, 17
Naha	29.83	+.07	29.98	10, 30	29.46	1
Chichishima	29.89	+.03	30.06	8	29.66	21
Nemuro			30.38	11	29.58	1

NOTE.—Data based on 1 daily observation only, except those for Juneau, Tatoosh Island, San Francisco, and Honolulu, which are based on 2 observations. Departures are computed from best available normals related to time of observation.

In the American tropics the American S.S. *Java Arrow* reported a moderate gale (force 7), with 0.06-inch fall in pressure, while west of Manzanillo, Mexico, on the 13th, and the observer noted that "apparently there was a storm of some intensity to the west of the ship." This

center was not identified, however, in any other observations reaching this office. During the night of the 13th–14th squally weather accompanied by southwest to west winds of force 7–8, but no depression of the barometer, occurred in the neighborhood of 12°–13°N., 96°–97°W.

Typhoons.—On August 29 a typhoon was reported as organizing about midway between the Marianas and the Philippines. On the 31st it lay south of Naha, when one Japanese ship reported a gale of force 9 in the vicinity to the Tokyo Meteorological Office. The typhoon began to recurve from this point and on September 1 lay between Naha and the China coast, whence it pursued a northerly and later a northeasterly course, until it was lost to observation near the coast of Kamchatka on the 7th. It attained full hurricane force on the 2d, if not earlier, when 100 miles or so east of Shanghai. The American S.S. *Golden Horn* (Capt. J. B. Knowles, master; Second Officer E. M. Black, observer), Moji to Shanghai, encountered winds of force 12 from northeast and east-northeast from about 8 p.m. of the 2d until after 1 a.m. of the 3d, and was in the typhoon's vortex from 2 to 3 a.m. of the 3d, lowest barometer 28.12, with a dead calm prevailing at 2:30 a.m. The observer commented upon the tremendous seas experienced prior to entry into the vortex, and upon the abnormal lessening and absence of confusion of the seas within the center. "Birds of many different types", he said, "littered the decks; over 300 were counted on the bridge alone. All were exhausted, even the Arctic tern, which is a very strong bird." The *Golden Horn* was then in about 35 fathoms of water. The west-northwesterly winds which followed the center did not reach their highest force (10) until 7 a.m. On the 5th fresh gales (8) from this storm were reported along both east and west coasts of central Japan, and strong gales (9) on the 7th in the Okhotsk Sea.

On September 9 a depression originated southeast of Yap. It moved along a generally northwest course until the 17th when, east of Taiwan, it turned northward across the Eastern Sea, then suddenly swerved across southern Japan and died out to the eastward on the 20th. This disturbance appears to have been of considerable depth on the 18th and 19th, but the Tokyo reports show no wind forces higher than 9 occurring in the Eastern Sea on those dates.[1]

Other minor disturbances of the Far Eastern tropics were (1) a depression of the 13th-18th which, originating near the western Marianas, moved northward past the Ogasawara Islands and caused gales of force 9 near 40° N., 150° E.; and (2) a disturbance of unknown intensity which gathered east of the Philippines on the 8th and moved northwestward into the northern part of the South China Sea, where, with slow westward progression, it continued during the 10th to 15th.

Fog.—At least 17 days with fog were reported along the California coast between San Diego and Eureka. Between Eureka and Vancouver Island fog occurred on 13 days. Along the northern steamship routes it was observed on 1 to 5 days, the localities of most frequent occurrence lying south and southwest of the Aleutian Islands.

TYPHOONS IN THE FAR EAST, SEPTEMBER 1933

By Rev. C. E. DEPPERMANN, S.J.

[Assistant Director, Philippine Weather Bureau, Manila, P.I.)

(1) *September 10.*—There are indications that this small but interesting typhoon started in mid-China Sea about September 8 and then traveled northeast to the west Balintang Channel, just northwest of northern Luzon. As usual, it was on the intertropical front (hereafter called more briefly the "tropical front") between the southwest monsoon and the trade wind. When definitely located on September 10, it had recurved westward and continued in this direction until it reached the Gulf of Tonking, where it filled up and disappeared. Why? The southwest monsoon stream had divided, the main portion crossing the Philippines to enter the typhoon of September 11; the rest was almost entirely blocked from reaching the typhoon by the mountain ranges of east Indo-China.

(2) *September 11.*—This typhoon started on the eastern branch of the tropical front. On September 9 there were strong suspicions of some depression passing between Guam and Yap, since the barometers of these two stations fell considerably (1.5 to 2 mm is "considerable" for these tropical stations). The southwest monsoon in typhoons still in the growing stage seems to occupy a V-shaped sector pointed northward. A little consideration will show that the center of the disturbance could already have passed the line (NE-SW) joining Guam and Yap and yet give no wind shift to southwest at the more southerly station, Yap. In fact, winds and cloud directions may seem to indicate a disturbance still to the south of Guam. This shift to southerly winds did not come until the 10th, when the front passed through Yap. On the 12th, as the typhoon came nearer to the Philippines, the front from the typhoon to the islands was very neatly given by the wind directions of 2 ships, 1 above and 1 below the front. It may be noted in passing that an almost infallible sign of a typhoon to the east of the islands, even before any fall of the barometer, is the presence of squally winds from the southwest sweeping through the islands on their way to feed the typhoon. On nearing the islands, the typhoon gradually recurved northward without touching them. The situation on September 17 is quite instructive. The typhoon was just below Ishigakajima in the Nansei group. From thence the front extended toward Guam, with trade wind to the east and southwest monsoon to the west. Again, from the typhoon over to mid-Indo-China, there was a sharp front between strong southwest monsoon winds and equally strong northerly winds from the Formosa Channel. Many ship reports from the China Sea enabled us to mark this front with the sharpness almost of a knife. In fact, on this front, close to western Luzon, a "baby" typhoon started, with barometers down to about 746 mm and wind force 10 to 11. Speaking rather timidly from observations only of the present year, this north-pointing V-sector of the southwest monsoon, with trade wind to the east and northerly Asiatic air to the west, seems to be typical of typhoons which curve northward and are soon to enter the eastward-moving circulation. The very moist southwest monsoon also seems to be the "feeder" of the typhoon by reason not of temperature differences but of the vast energy it can release by condensation of its ample supply of water vapor (cf. Refsdal, Der Feuchtlabile Niederschlag, Geofys. Publ., vol. V, no. 12, p. 62, ff. and other Norwegian publications). By the 17th, the typhoon had increased much in intensity, passing over Ishigakajima, which station was temporarily disabled, giving no more weather observations until the 20th. The storm continued northward until about 100 miles east of Shanghai. The *President Cleveland* just about this time (Sept. 19) was close to the center, and reported 726.7 mm, wind force 12, tremendous sea. Two Japanese ships sent out SOS. As far as could be ascertained from newspaper reports, only one of these

[1] For a detailed account of this storm, see the following article on typhoons by the Rev. C. E. Deppermann, S.J.